

Extreme Snowfall Events Linked to Atmospheric Rivers via Satellite Measurements

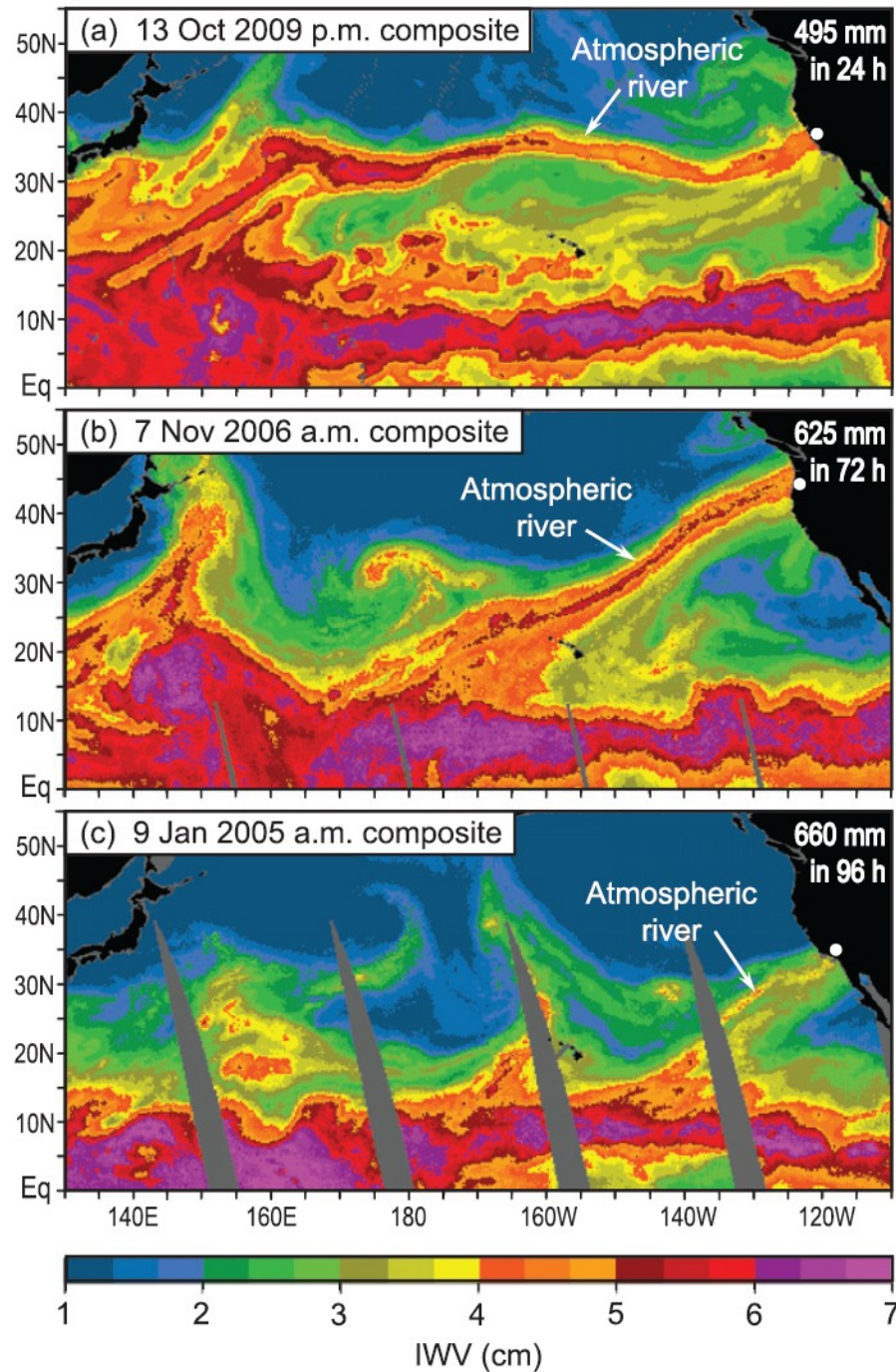
Bin Guan

Jet Propulsion Laboratory, California Institute of Technology

With thanks to

Duane Waliser, Noah Molotch, Eric Fetzer, and Paul Neiman

Atmospheric Rivers



Ralph et al. 2011

A natural hazard



Photo credits: CBSnews.com

A water resource

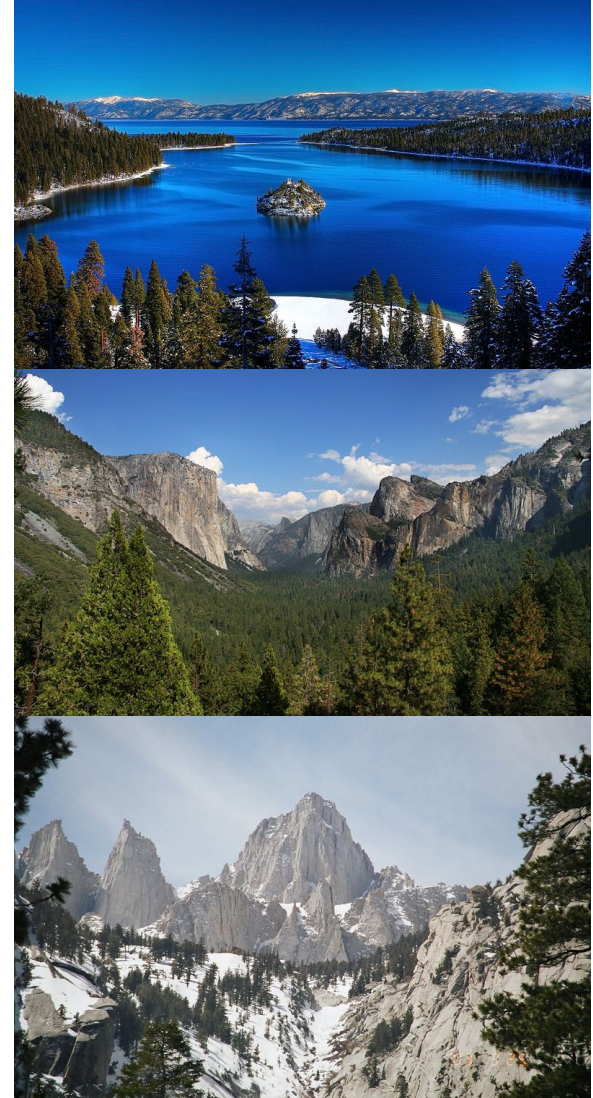
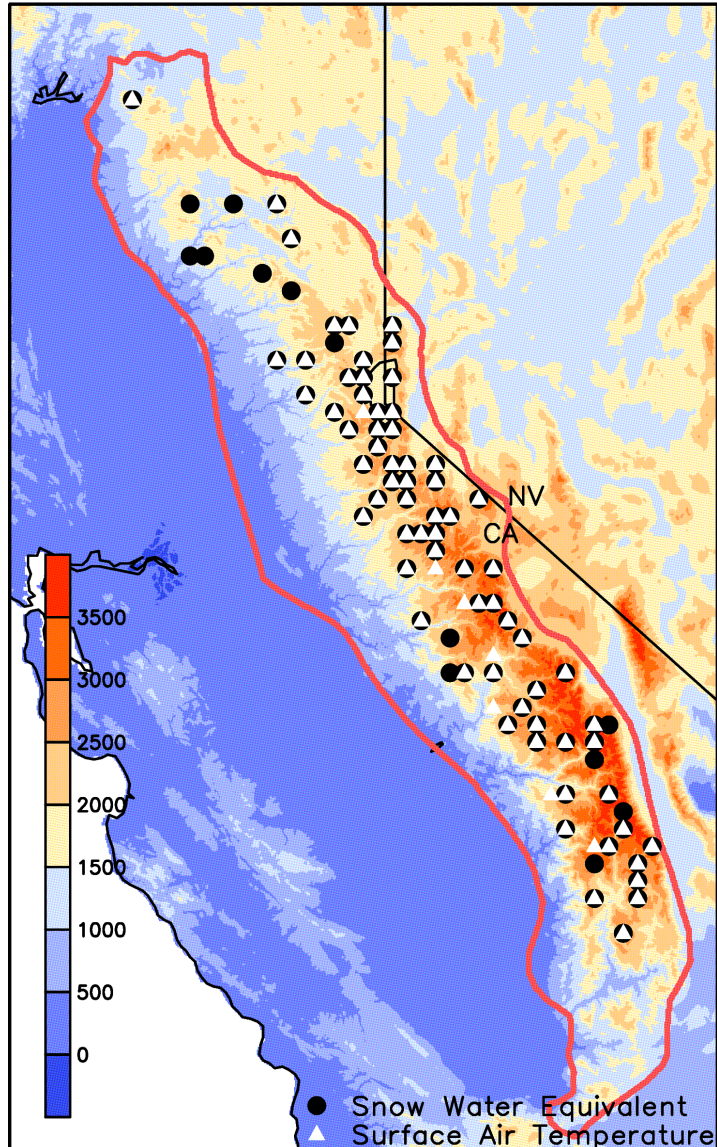
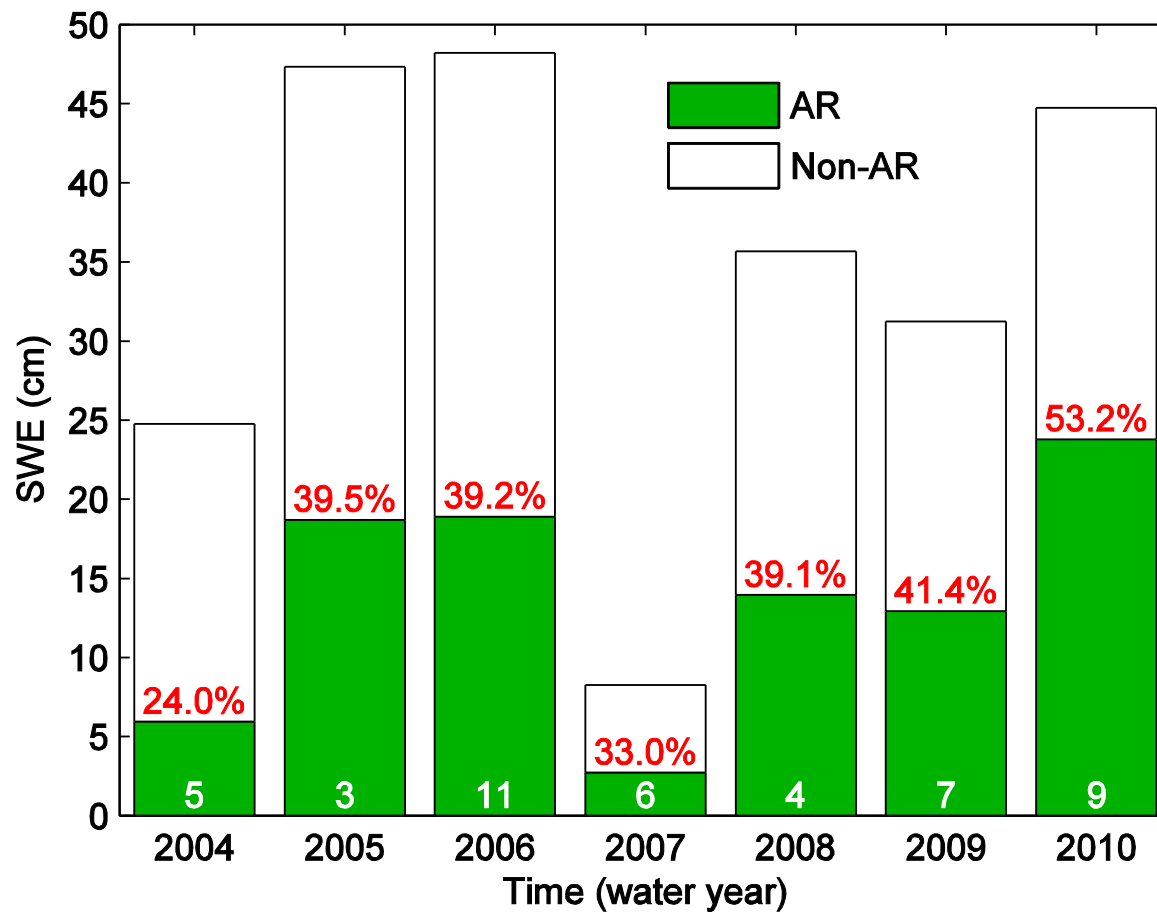
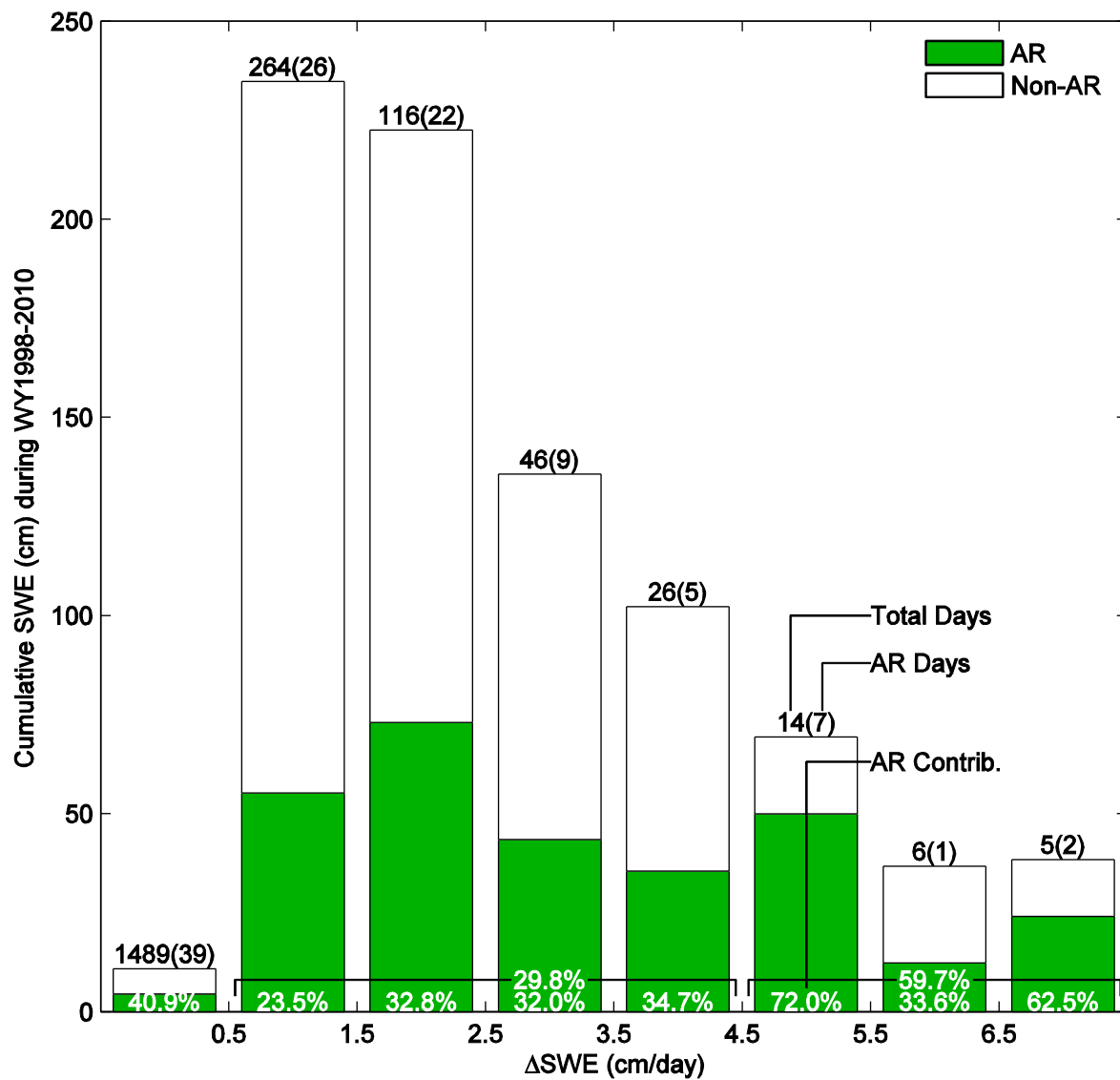


Photo credits: Wikipedia



AR/Tot Snow
40%



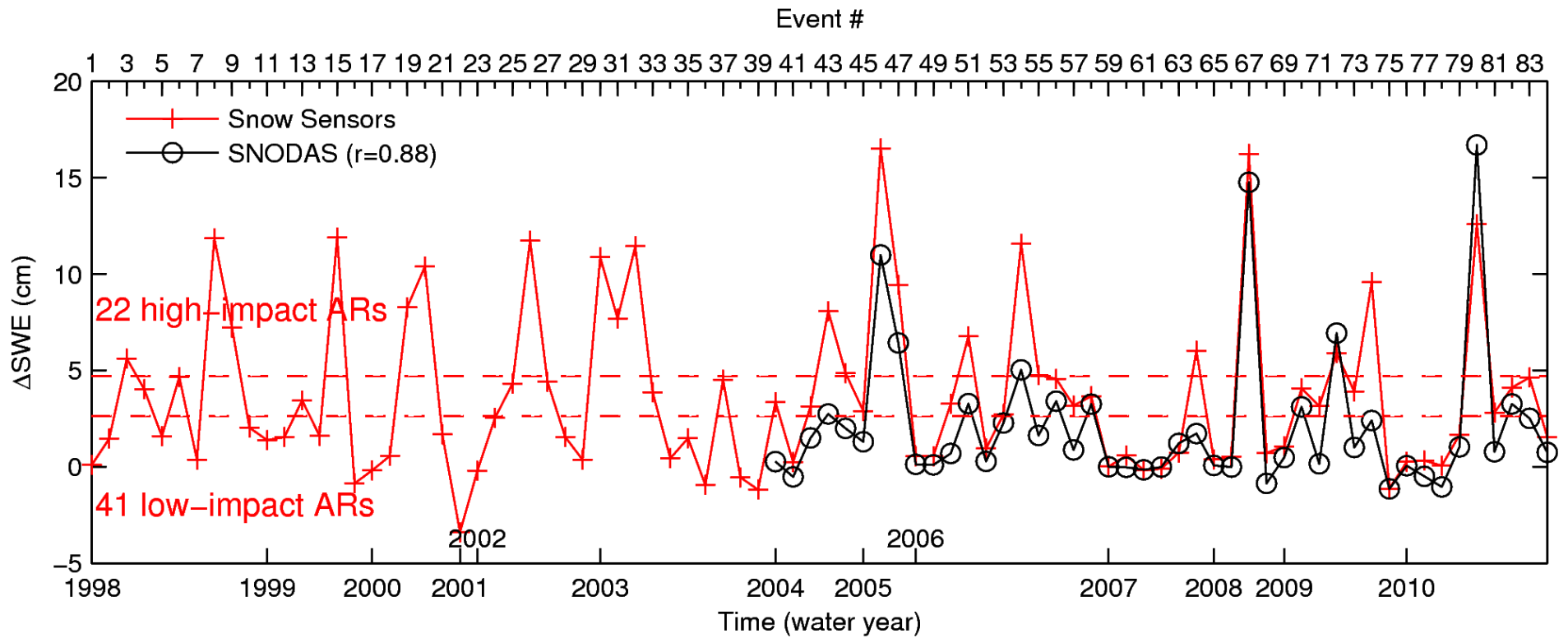
Weaker Events

30%

Stronger Events

60%

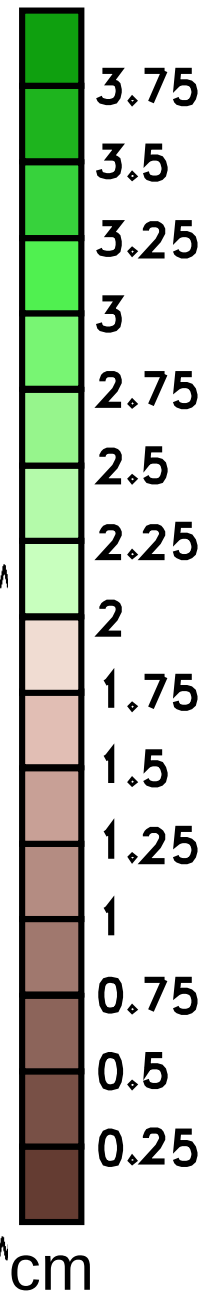
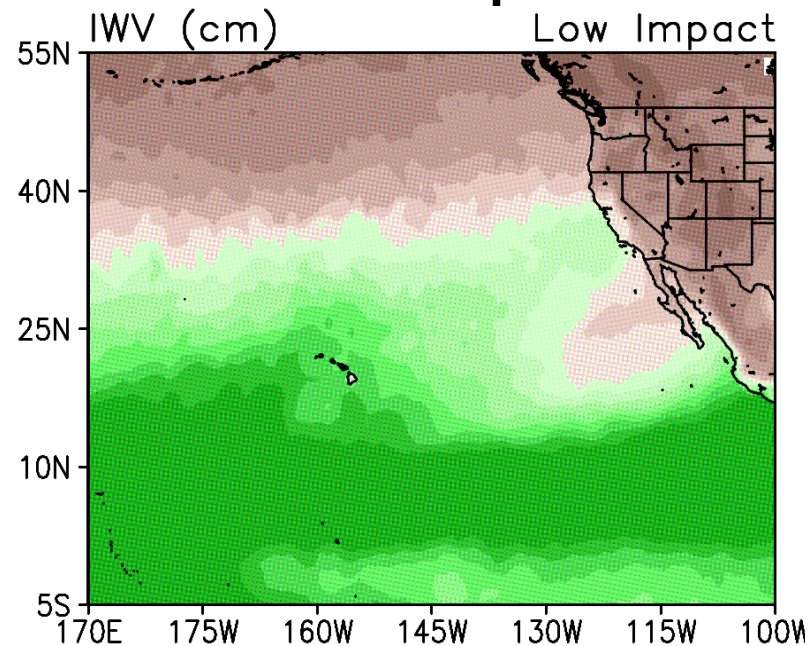
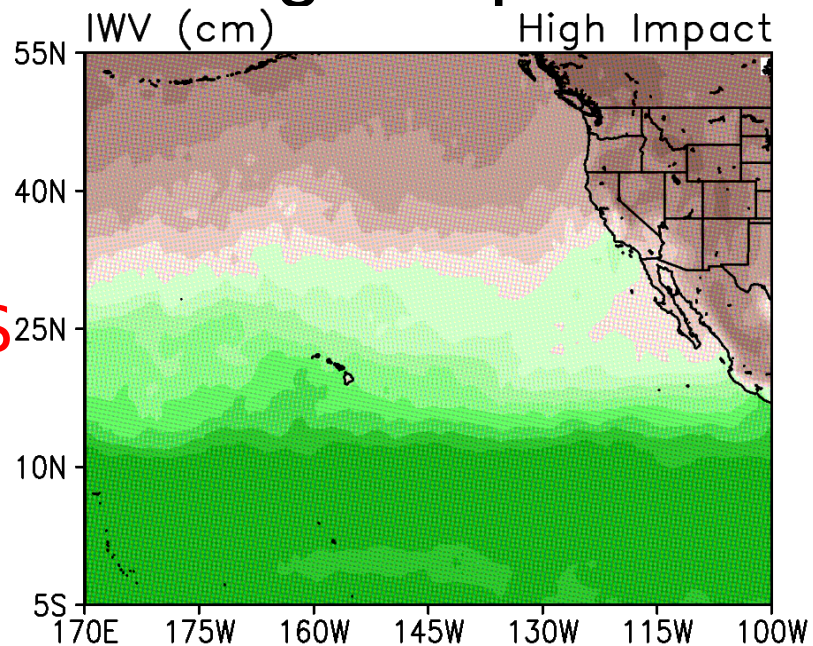
Event Variability



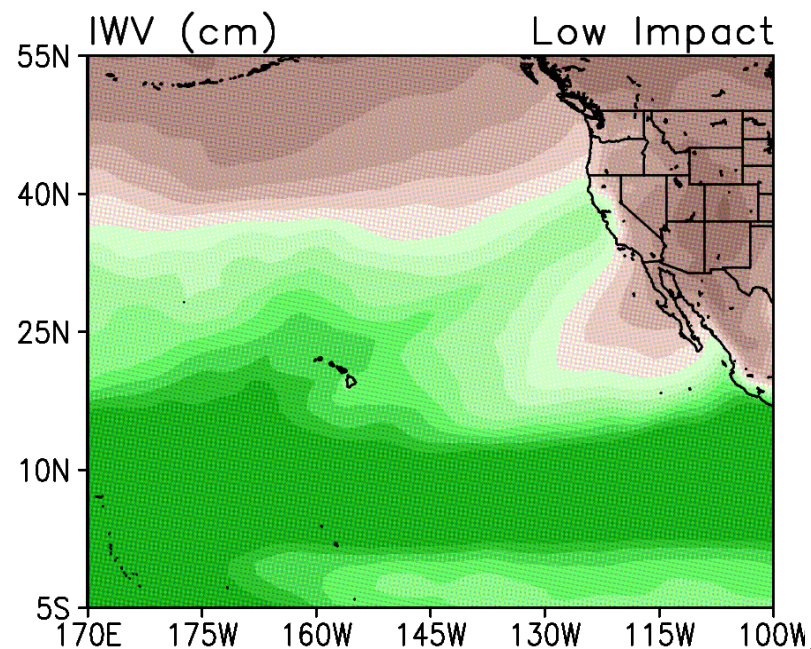
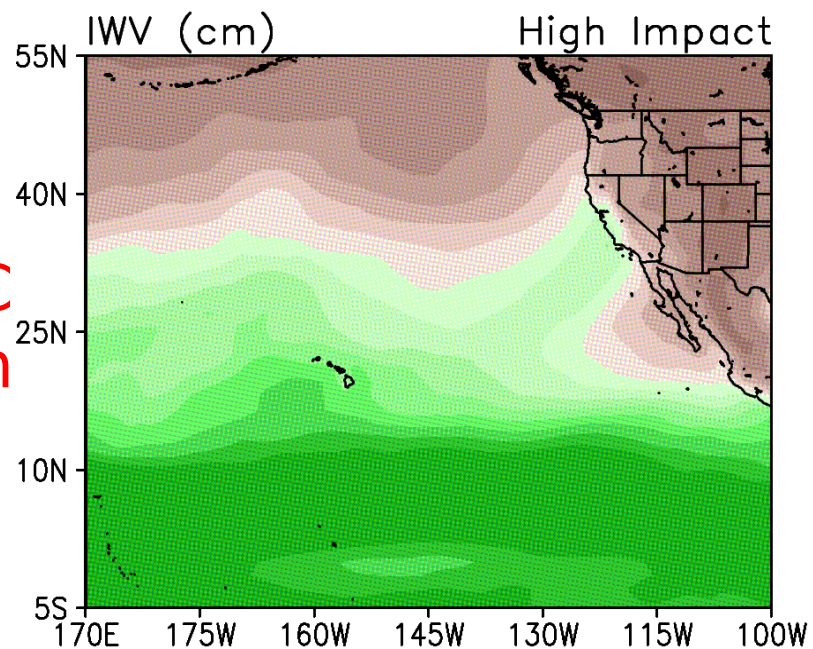
High Impact

Low Impact

AIRS



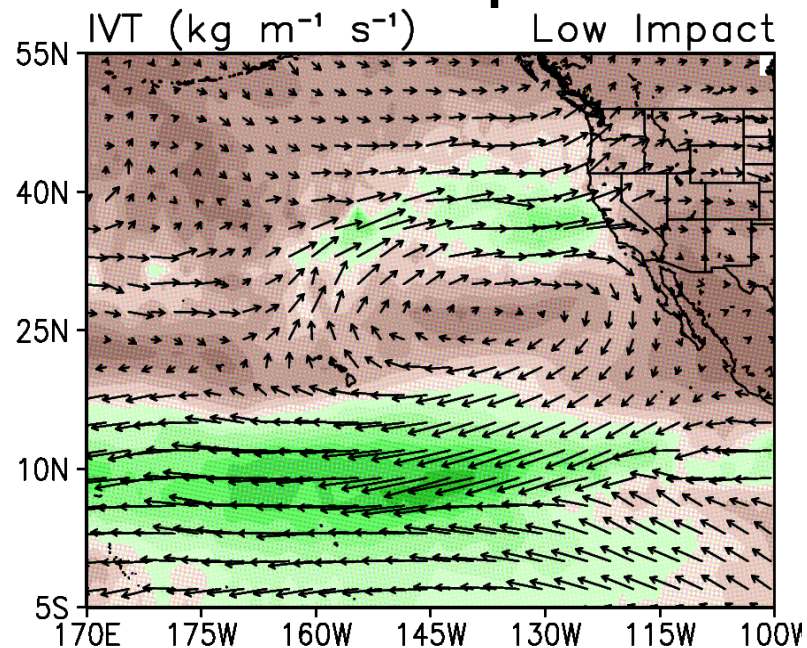
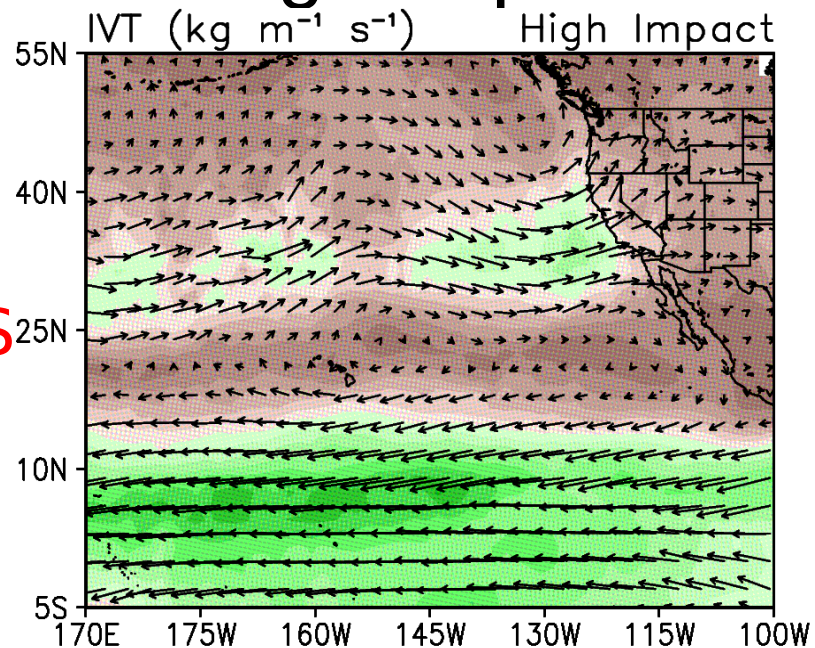
EC
Interim



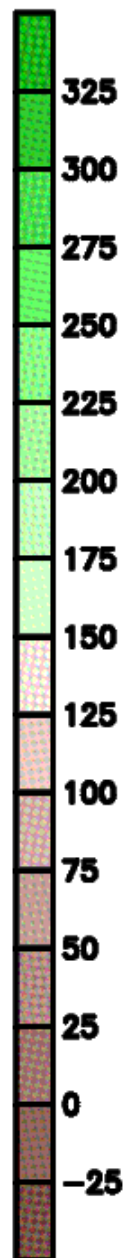
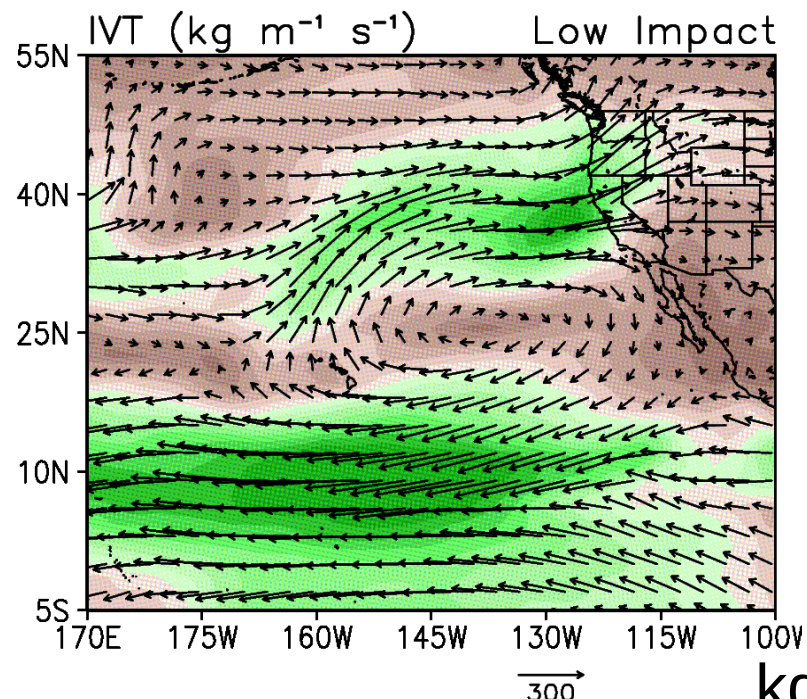
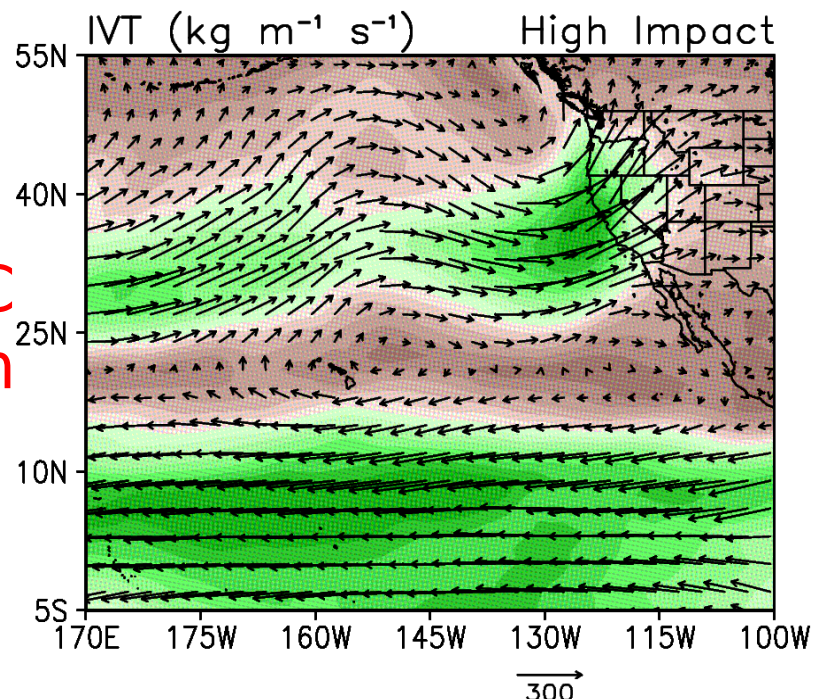
High Impact

Low Impact

AIRS



EC
Interim

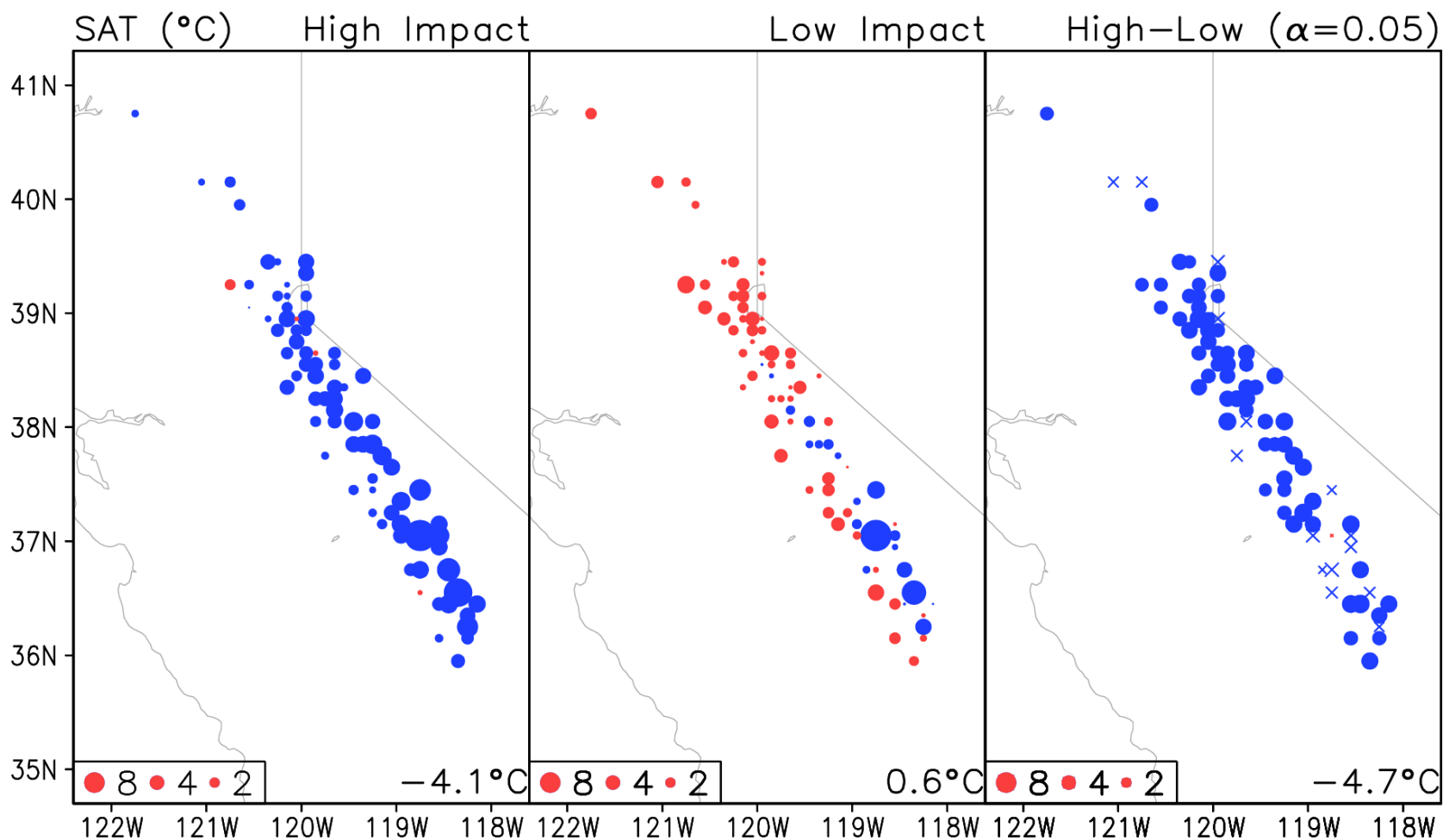


kg/m/s

High Impact

Low Impact

Diff

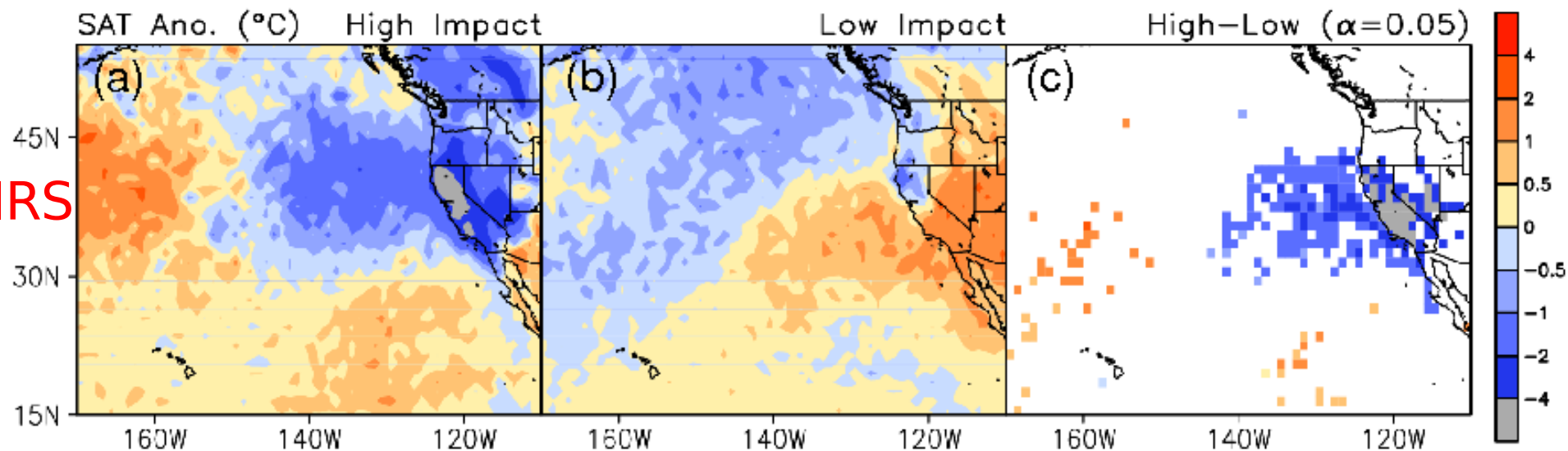


High Impact

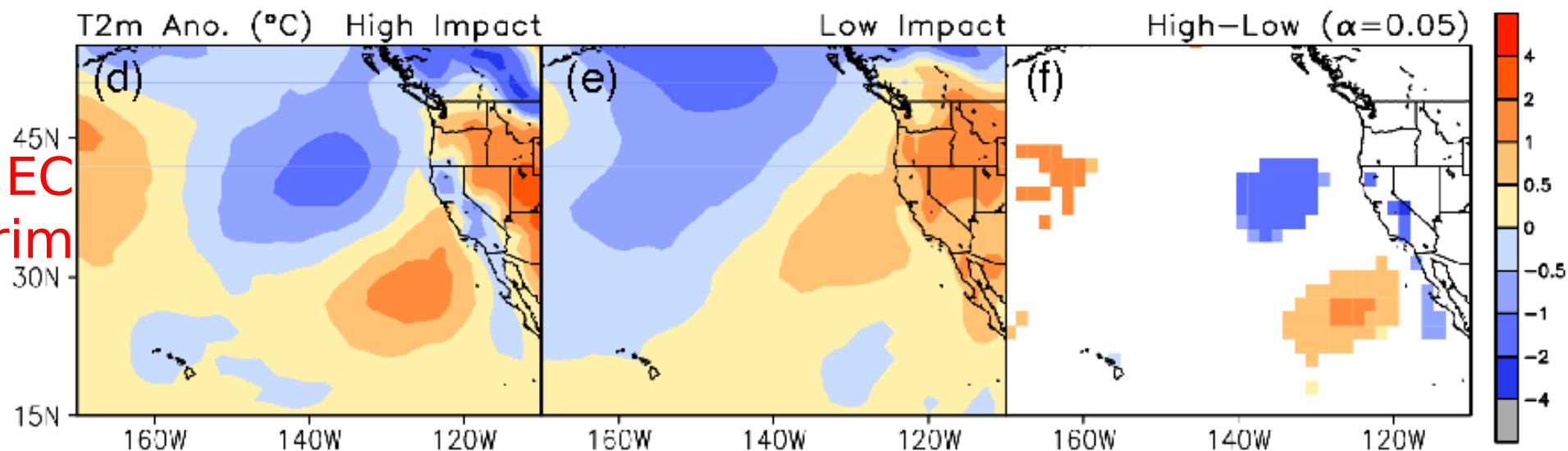
Low Impact

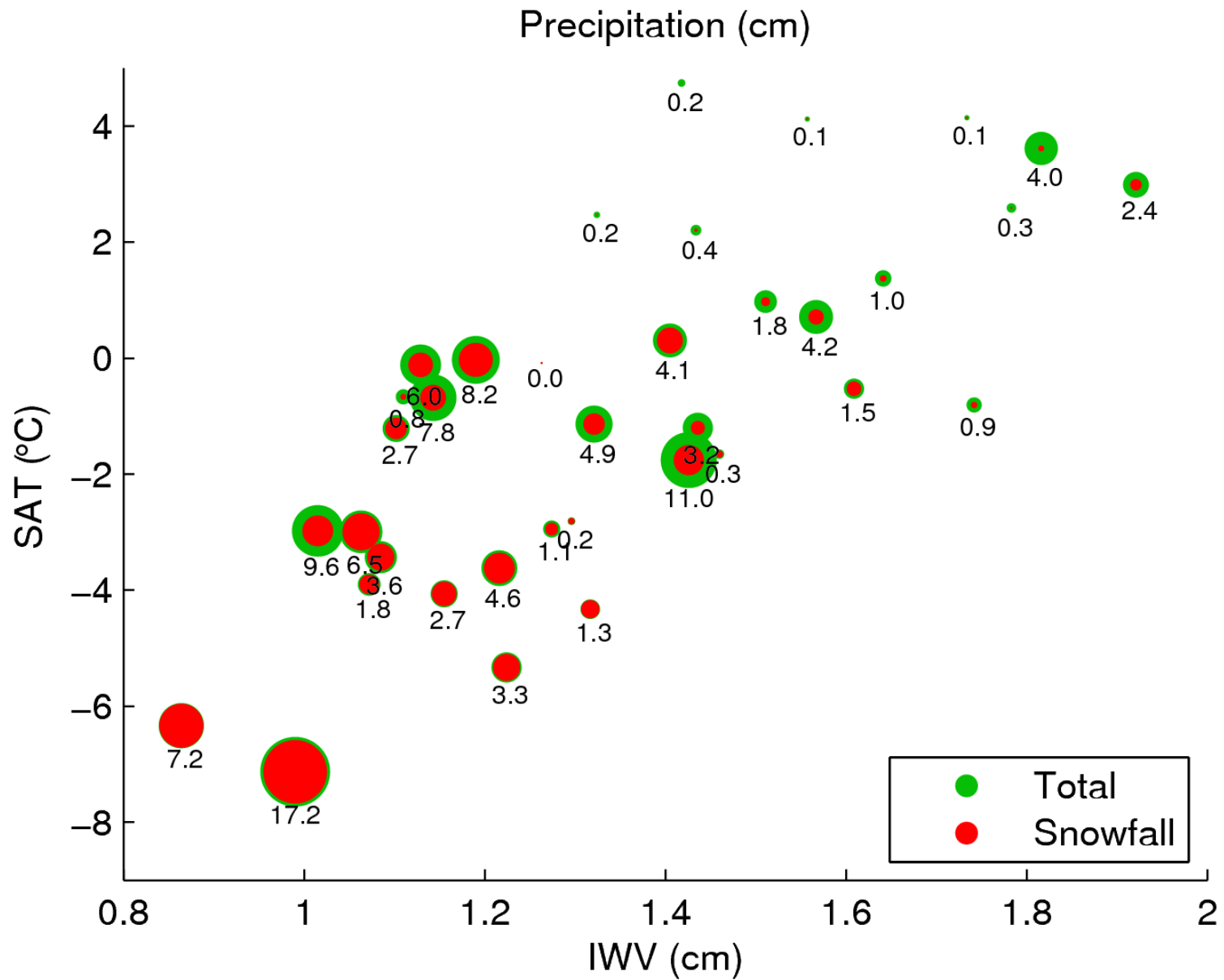
Diff

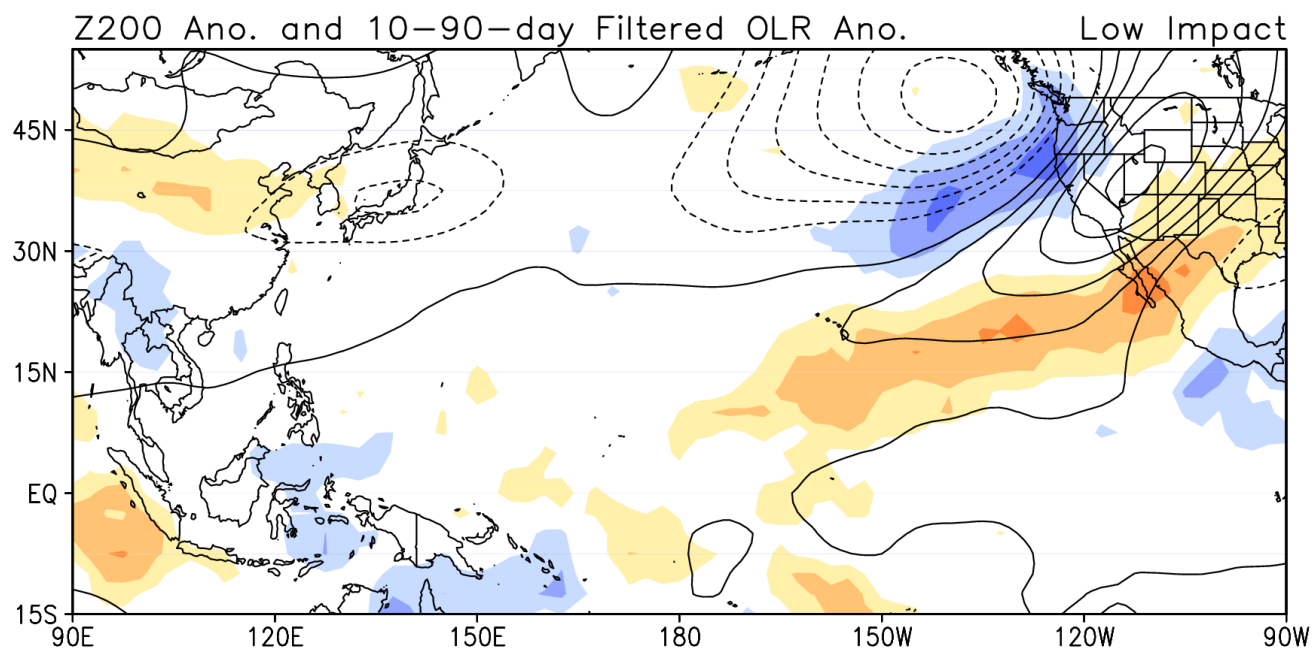
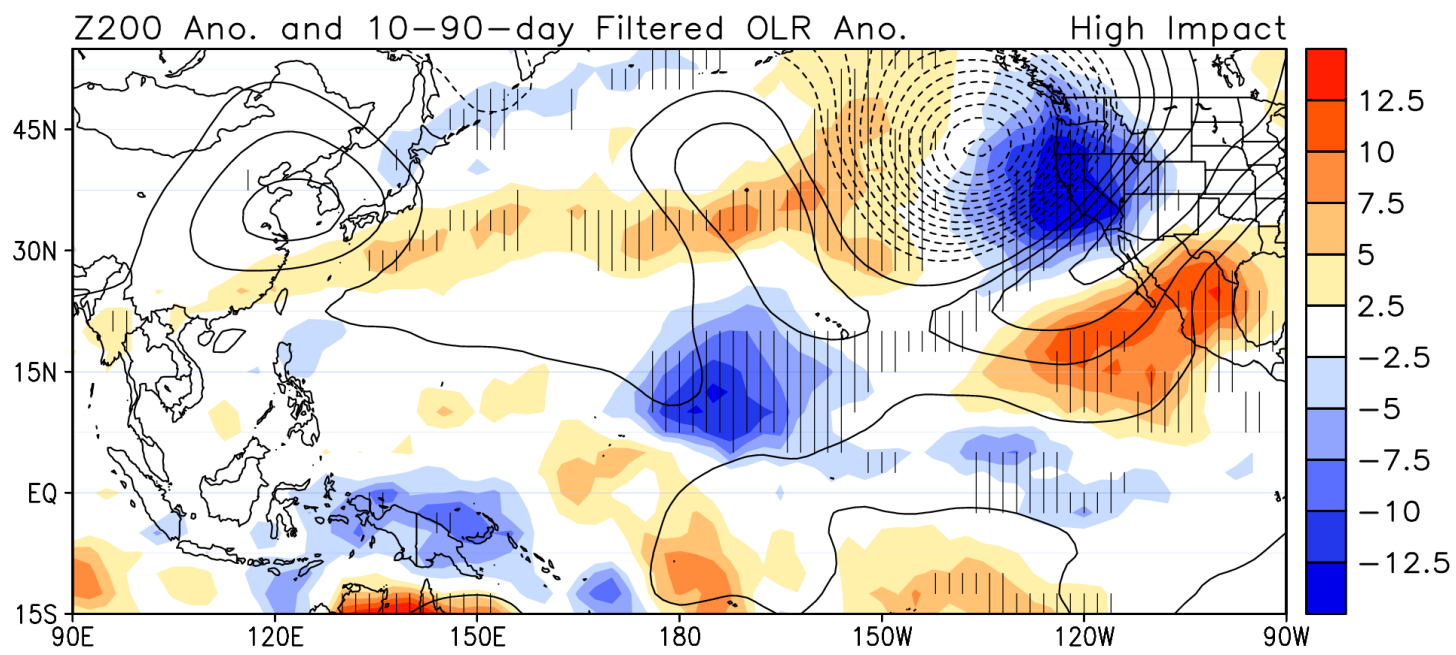
AIRS

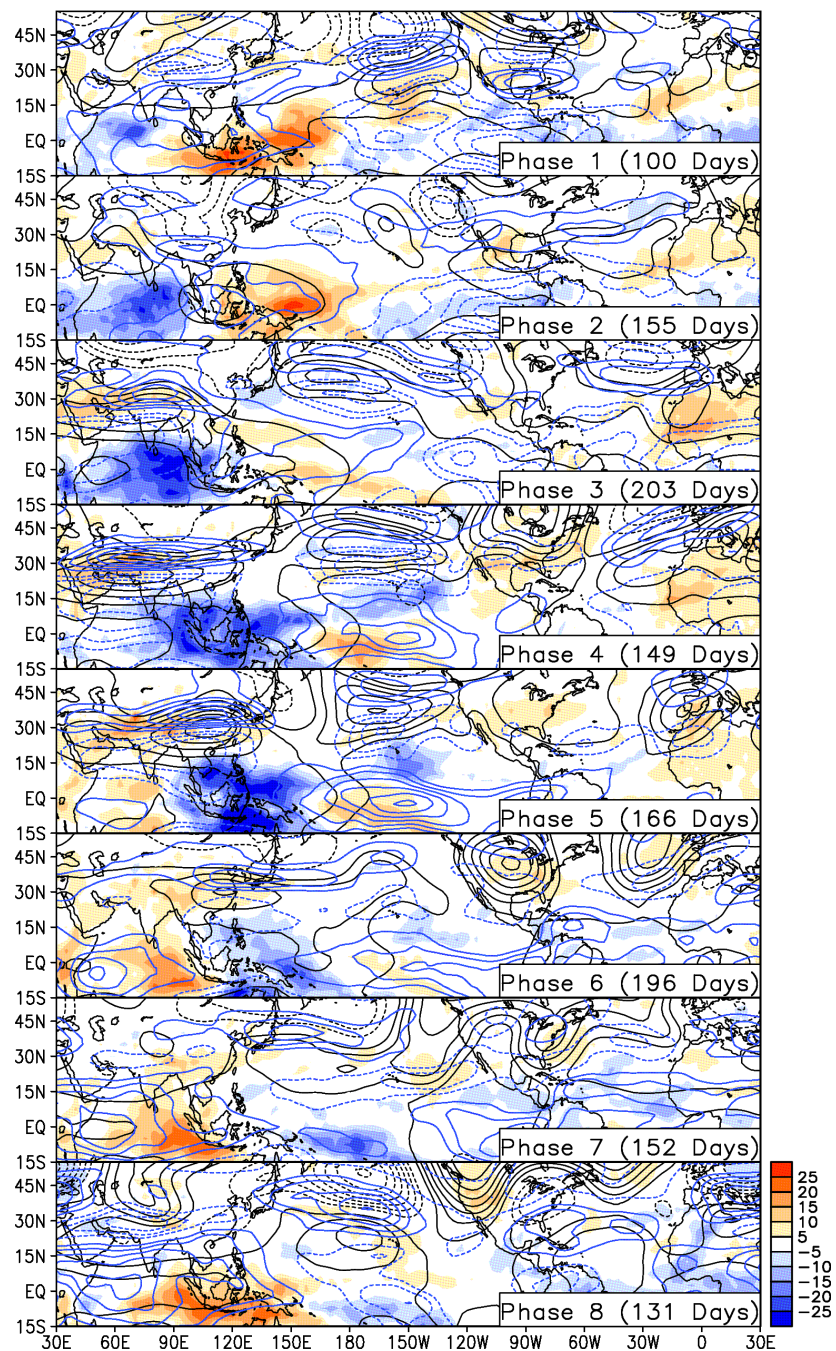


EC
Interim

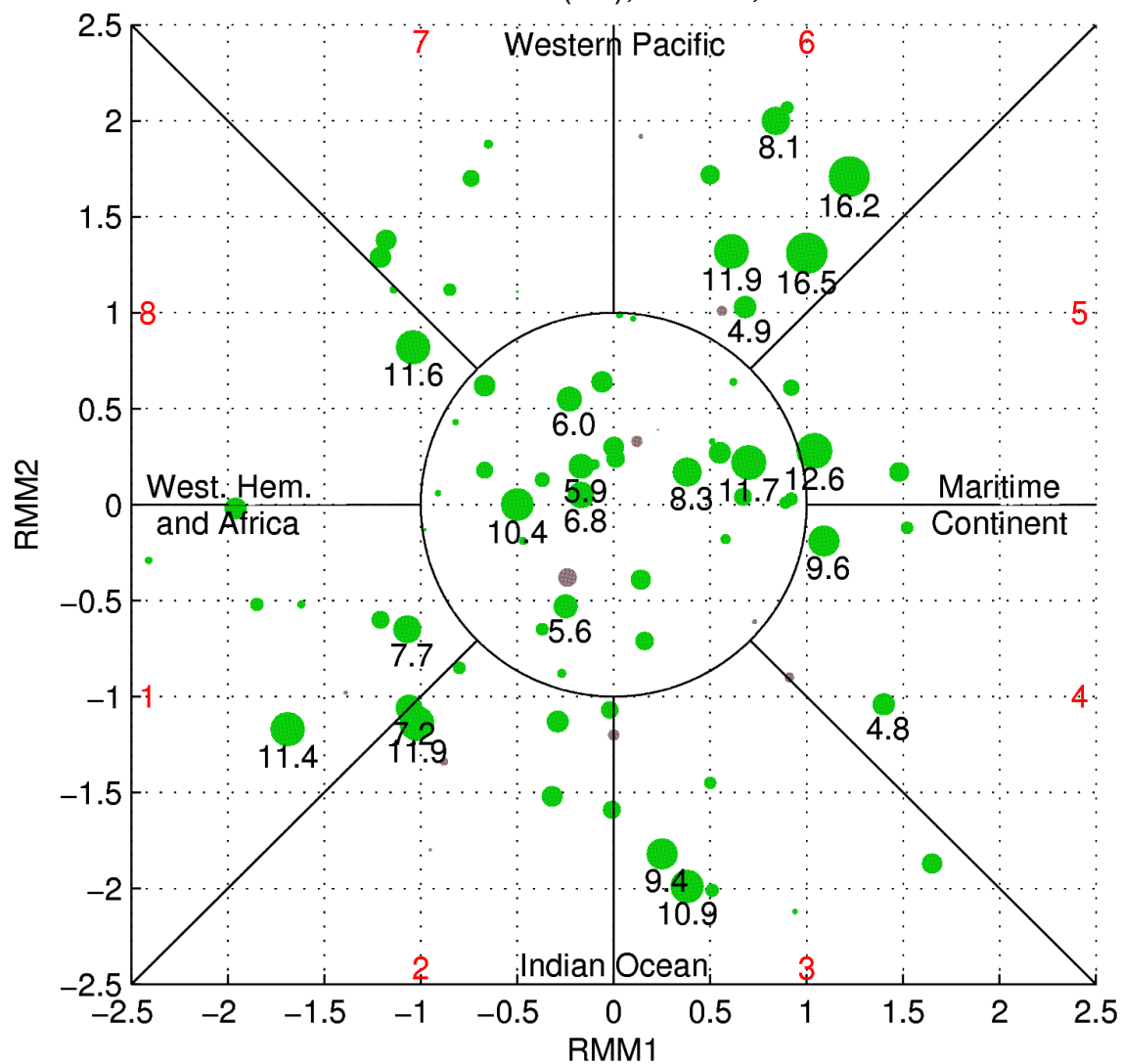


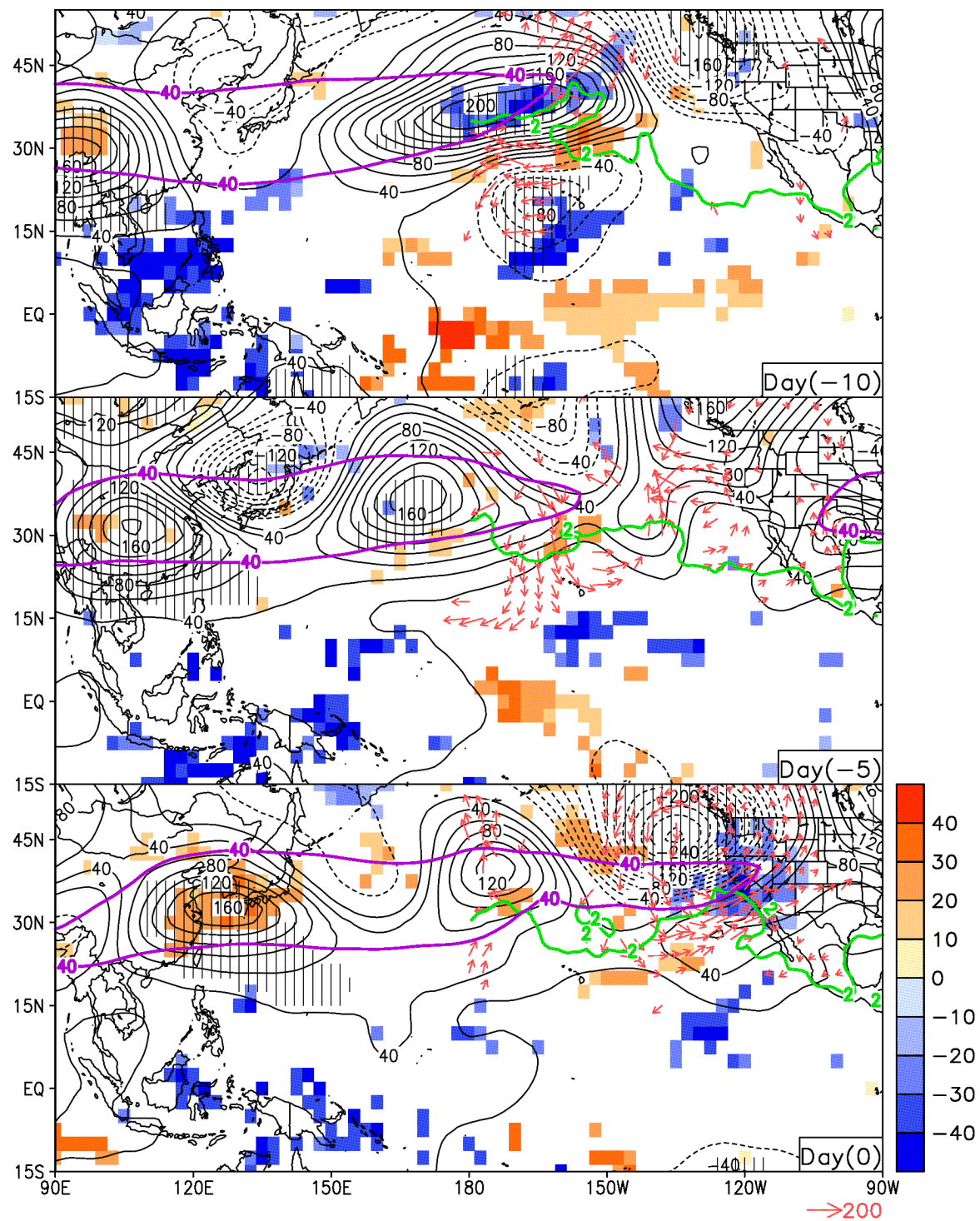






MJO and Landfalling ARs in California:
Sierra Nevada Δ SWE (cm), NDJFM, WY1998–2010





Atmospheric Rivers

40% contribution to Sierra snow

Close connection to **extreme** events

Moisture and temperature characteristics
well observed by **AIRS**

Increased activity during **MJO** phase 6